DOCUMENT RESUME

ED 134 457 SE 021 931

TITLE	Science K-12, Living Things in Continuous Change. Utica City School District Articulated Curriculum: Project SEARCH, 1975.
INSTITUTION	Utica City School District, N.Y.
SPONS AGENCY	Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE	75
NOTE	36p.; For related documents, see SE 021 926-930; Not available in hard copy due to marginal legibility of original document
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Behavioral Objectives; Biology; *Curriculum Guides; Earth Science; Educational Objectives; *Elementary School Science; *Elementary Secondary Education; General Science; Integrated Curriculum; *Science Education; *Secondary School Science
IDENTIFIERS	Elementary Secondary Education Act Title III; ESEA Title III

ABSTRACT

Two-column objectives are listed for an integrated science curriculum (grades K-12), often subheaded according to science area (biology, general science, physical science, earth science) and grade level. In grades K-6, objectives for topics of science study include conditions for plants and animals to live, adaptation, conservation, photosynthesis, ecological succession, pollution, and geologic change. Groupings of objectives in grades 10-11 relate the study of evolution to population genetics and classification to evolution. Grade 12 includes non-grouped objectives in problem solving, structure and function of cells, plant cell growth, algae, fruit fly genetics, mineral composition of bone, and regeneration in Grantia. (CS)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED134457

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Utica City School District

Articulated Curriculum

Project Search

1975

Draft Copy

SE 021 931

AUG 23 1976

FORWARD

This Articulated Curriculum is being printed and bound in this manner to provide for on-going revision. This also serves as evidence of work completed during Phase III of Project SEARCH.

SCIENCE

K - 12

LIVING THINGS IN CONTINUOUS CHANGE

ACKNOWLEDGEMENTS

TEAM LEADERS: Joan Achen, Ernestine Boykin, Anita Didio, Barbara Klein, Patricia McNamara

TEACHERS: Valdemara Aldag, Paula Angerosa, Elizabeth Bali, Rosemary Battey, Ruth Bennett, Thelma Boesch, Linda Bullard, Margaret Capalupo, Anthony Carchedi, Sheila Cardarelli, John Convertino, Rosalie DiMeo Elizabeth Crandall, Rosemary Dellerba, Carol DePhillips, Gordon Didio, Ann DiNicola, Kathryn Engel, Mary Fusaro, Soraida Garcia, Joseph Granato, Margery Grant, Margaret Gregory, Marcia Guidery, Marian Hall, Bernadette Holehan, Carol Hughes, Paulette Jackson, Eleanor Jenkins, Kathleen Johnson, Ethel Kaplan, Anne Keeler, Frances Klay, Jane Kretschmann, Beatrice Lane, James Lasher, Mary Leahy, Ralph Leo, Bonita Lewis, Gail Lewis, Barbara Marchilonis, Susan McCann, Catherine McGurn, Doreen McShea, Adele Merrill, Patricia Mundschenk, Joanne Napoli, Sally Opalka, Jean Owens, Carl Pecheone, Arthur Perry, Elaine Polito, Marian Raymer, Linda Resigno, Linda Roberta, Marilyn Robertaccio, Phyllis Rosenthal, John Russo, Joseph Scarafile, Gary Schor, Lula Sessum, Carol Simrell, Florence Sitrin, Louise Sonnichsen, Carol Spanfelner, Marcia Sullivan, Loretta Tagliaferri, Joseph Taurisani, Delores Warzala.

TEAM LEADERS: 7 - 12 Louis Cizza, John Distante

TEACHERS: Donald Alberico, Barbara Campione, Alfred Candido, Thomas Cardillo, Jr., Carmella Catera, Gary Caulkins, Basil Colocotronis, Robert Conkling, Richard Converse, Mildred Coury, Robert Cubino, Samuel D'Amelio, Daniel Donato, Erma Drazil, Helen Fanelli, Nancy Fath, Thomas Feisthamal, Arthur Felio, Irene Fenton, David Foxx, Justin Gaffney, Antoinette Gillette, Lorraine Godlewski, Jay Hagenbuch, Leo Handler, Donald Henderson, Frank Jacobs, Ralph Lupia, John Marleau, Constance Mierzwa, Janice Mierzwa, Anthony Militello, Patrick Moccaldi, Louis Natale, Per Omland, Joseph Pellegrino, James Powell, Mary Lou Pristera, Salvatore Pristera, Adele Reilly, Joseph Rizzo, Chester Rosenburg, Carl Ruffrage, Jerome Sacco, Myron Sierson, Catherine Tomaino, Matthew Vitucci, Robert Warwick, Pasquale Zegarelli, Raymond Vitucci.

PROJECT SEARCH

ARTICULATED CURRICULUM

EDWARD J. PERRY

Superintendent of Schools

Project Search Administrative Team

BERNADETTE EICHLER: Administrator for Elementary Education

SENATRO D. LaBELLA: Administrator for Secondary Education

DR. ANGELA M. ELEFANTE: Coordinator, Project Search

GERARD GRANIERO: Member, Board of Education

UTICA BOARD OF EDUCATION

MR. JOSEPH H. HOBIKA - President

MR. JAMES W. ALLEN - Vice President

MRS. JEANNE ARCURI
MR. THOMAS CARVILLE
MR. GERARD GRANIERO
MRS. FRANCES MARINO
MR. VITO MONTECALVO

August 1975

MRS. ROSE DANELLA and NORMAN I. SIEGEL, both former Board Members deserve special mention for all their efforts on behalf of Project SEARCH.

UTICA CITY SCHOOL DISTRICT
13 Elizabeth Street
Utica, New York 13501

SCIENCE

LIVING THINGS IN CONTINUOUS CHANGE

Grade K

The student will know:

- That plants and animals need food, air, and water to live.

The student will:

- After making a terrarium (utilizing local plants), describe observations, such as moisture and condition of plants.

- After planning and caring for an aquarium, describe observations such as:
  a. water condition
  b. feeding procedure (by stimulus, for example)
  c. breeding
  d. temperature control
  e. care for water plants.

- After having and caring for a visiting pet in the classroom discuss observations such as
  a. behavior
  b. similarities and differences with other animals.
  c. animal needs
  d. how feelings change about animals.

- That green plants need light to grow.

- Compare two plants-one will be given water and light and the other will not. Alternate water and light with two other plants and compare the results. Observe:
  a. the plants were originally planted under the same conditions.
  b. condition of leaves of each plant.
  c. condition of soil of each plant.
  d. one plant under certain conditions will show increase in growth.

LIVING THINGS IN CONTINUOUS CHANGE

Grade 1

- That some animals live on land, some live in water; and some live on land and water.
  - Identify characteristics of animals that live on land; identify animals that live in water; identify animals that live on land and water.
  - Explain how outer coverings and movement of animals can determine where they live.
- That some animals survive cold weather. Seasonal changes affect living things.
  - Name three animals that survive cold weather.
  - Identify animals we see in cold weather.
  - Explain how humans help animals survive in cold. (bird feeders, etc.)
  - Discuss migration of animals in wintertime.
- That certain conditions, such as food and air are necessary for living things to survive.
  - Compare and contrast verbally the differences in growth of plants that have been watered and put in light with those that have been uncared for. (See Kindergarten)
  - Discuss care of pets-food, shelter.
  - Discuss abuse of pets.

Grade 2

- That some animals eat plants, while others hunt animals for food.
  - Identify pictures of animals that eat plants and animals, plants, or just animals.
  - Group selected jawbones (or pictures of jawbones) into categories to demonstrate which animals eat plants, plants and animals, or just animals.
  - Record the diet of a class pet.
- That green plants make their own food. Green plants store food in their roots, stems, leaves, bulbs, and seeds.
  - List green plants that store food in each of the following categories-roots, stems, leaves, bulbs, and seeds.

- That some animals move from place to place with the seasons in order to find food.	- Discuss what happens to birds, snakes, and frogs in different seasons. - Draw pictures of animals that migrate.
- That living things change as they grow.	- Compare pictures of baby animals and adult animals. - Record growth of various plants in the classroom and discuss observations.
	Grade 3
- that many plants and animals are adapted to living in certain kinds of places.	- explain why certain plants and animals are adapted to their environments. e.g. Explain why penguins are adapted to surviving in the Antarctic. - identify from selected pictures, plants that have adapted to a certain environments. e.g the cactus plant in a dezert area.
- That many animals have special adaptations which protect them from their enemies.	- identify several animals that adapt to their surroundings in order to protect themselves from their enemies., e.g. snowshoe rabbit. - indicate the special adaptations of each animal that has been previously identified as adapting to its surroundings. - explain the purpose served by each adaptation that has previously been identified.
- That man should exercise good conservation practices so as not to disrupt the interdependence of living things.	- Compare good conservation practices with poor conservation practices. - Explain why it is important to protect our forests from careless campers.

CONTINUED

- That seeds are distributed by explosion, wind, water, and animals.

- That some plants produce bulbs or tubers, while lower plants, such as mold, fungi, and ferns reproduce by spores.

- That green plants combine CO^2 with water to produce their food.

- That sunlight provides the energy for the process of photosynthesis.

- That living things are classified as plants or animals.

- That living things are interdependent upon one another and on their environment.

- The environment is constantly changing.

- Explain why the buffalo herds almost died out and discuss similarities of today's endangered species.

Grade 4

- Explain dispersion based upon observations made when blowing on a dandelion.
- Construct a collage showing the methods of seed dispersion.
- Chart growth of bulb placed in container with stones.
- After planting the eye of a potato, record its growth.
- After performing experiments, describe how green plants provide and produce food.
- After performing experiments using variables (Controls) in several experiments, explain how sunlight provides energy for photosynthesis.
- Classify pictures of plants and animals in appropriate categories.
- Trace diets to indicate dependence upon plants.
- Illustrate the food chain.
- Construct a chart showing changes in the environment since the ice age.
- Analyze projected changes in the future.

LIVING THINGS IN CONTINUOUS CHANGE — Grade 5

- The three basic necessities for survival and will be able to distinguish their priorities, while also realizing that certain conditions, at times, affect survival.	- After viewing and discussing films, for example, "Animals of the Forest," etc., the student will analyze conditions for survival based on the three major concepts of Food, Clothing and Shelter. Each of these three will be based upon the criteria set up by the National Aeronautic and Space Administration. - Describe what things are needed for survival on the moon.
- that living things have changed over the ages.	- construct replicas of the evolution of man from "Caveman" time to the present. He will then select those physical characteristics which show change.

LIVING THINGS IN CONTINUOUS CHANGE — Grade 6

- that related living things reproduce in similar ways.	- describe how plants reproduce. - describe how animals reproduce. - make comparisons on their methods of reproduction.
- that all living things need water, light, oxygen, and food.	- hypothesize outcome of depriving a living thing of the necessities of water, light, oxygen, and food.
- that all living things are made of cells.	- label all the parts of a plant or animal cell.
- that without the sun's energy, green plants do not make food and cannot live.	- describe the process of photosynthesis.
- that all living things respond to stimuli.	- describe hydrotropism. - describe phototropism.

CONTINUED

- that all living things must be able to adapt to changes in their environment.

General Science

- The stages found in ecological successions.
- The causes of pollution.
- That plants have gone and are undergoing continuous change.

Biology

- Evolution, and the causes of changes in population gene pools, and how a biologist studies relationships among organisms and their ancestors as evidence supporting the theory of evolution.

- describe autotropism.
- explain why certain plants and animals have become extinct.

LIVING THINGS IN CONTINUOUS CHANGE

- List the changes in dry land habitat succession.
- List the changes in aguatic succession.
- List changes animals must undergo to cope with pollution.
- Define the 3 plant kingdoms.
- Name the structural differences in the 3 plants kingdom.
- Name the geological evolutionary periods and name the structural differences shown to occur.
- List structural changes which have been shown to be occuring in the world today.

Grade 10

- Define evolution as change among living things over a period of time.
- Define and cite examples of fossils and describe how they are formed.
- Describe how paleontologists use radioactive isotopes to determine the age of fossils.
- List ways in which comparative anatomy supports the concept of evolution.
- Compare and contrast homologous organs or parts and analogous organs or parts.

CONTINUED	- Describe Lamarck's law of use and disuse. - Explain why it is not possible for organisms to inherit acquired characteristics as Lamarck believed. - Explain what is meant by Darwin's theory of natural selection. - Compare and contrast the two theories of evolution as explained by Lamarck and Darwin.
- How principles of population genetics can be used to explain the evolution of adaptaion and of new groups or organisms.	- Describe industrial melanism and how it illustrates evolution as an interaction of organism and environment. - Compare and contrast adaptations involving camouflage, warning coloration, and mimicry. - Explain what is meant by reproductive isolation. - Define ecological niche. - Describe the experiments conducted by Stanley Miller.

Physical Science	Grade 10-11
- The background of carbon chemistry and living things.	- Draw the molecular structures of a few carbon compounds. - Show how carbon compounds form isomers. - Identify a number of carbon compounds and list them in different classes. - Write a few reactions involving carbon compounds.
- That unsaturated organic compounds are much more reactive than saturated compounds.	- Start with a methane molecule and by substitution form: chloroform, difluoro-dichloromethane, tetrachloromethane. - Start with ethylene and add hydrogen and/or chlorine atom to show addition reactions.

- That polymers are high molecular weight compounds.	- Build a polymer from several ethylene models.
- The different classifications of organic systems.	- List the classes of alkanes, alkynes, etc. - List of the classes of carbohydrates, etc. - Learn the nomenclature of each class of compounds. - Show how the properties of each class depends upon a group which identifies each class.

Biological Science — Grade 10-12

- There are many different kind of living things. (diversity).	- Write a description of 10 different organisms and conclude that they are all different
- There are many different kinds of life in the soil.	- Isolate several different kinds of organisms from a small quantity of soil.
- Misroscopes extend the senses to help us see the great diversity of life.	- Use themicroscope in finding protozoa.
- There is a great diversity of life in a drop of water.	- Demonstrate how to use the microscope in finding protozoa and other animals.
- Despite the diversity of life, all living things are made of cells.	- Perform is using the microscope in finding various cells.
- Living things can be put into related groups. (classification)	- Group cards and cardboard cutouts into related groups. (also classify 100 different laboratory jar animals into phylums).
- Order in classification is based on body structure.	- Feed data into a set of punch cards and then sort them out into related groups.
- Fossils furnish evidence for living things in pre-historic days.	- Make model fossil castings and examine fossil specimens.

- Fossils furnish evidence that living things have changed through time.	- Examine data from fossil horse teeth and legs and make a graphical comparison.
- There is variation within each species.	- Measure pea seeds diameters, leaf length, and human reaction distance.
- Nature selects the fittest to survive.	- Pick out different colored and different-sized objects and note that their selection are not a normally distributive selection.
- Skin coloration is the result of natural selection.	- Observe that their is a delicate balance between the amount of melanin and vitamin D produced by the sun.
- There there are anatomical changes that took place between animals over a long number of years.	- Dissect the earthworm, fish, and frog within a 2 week period.
Earth Science	Grade 11
- Hydrospheric pollutant include dissolved and suspended materials such as organic and inorganic wastes, thermal energy and abnormal concentrations of various organisms.	- Construct a chart of all possible pollutants.
- Concentration of water pollutants in rivers increases in the vicinity of population centers.	- Draw up a graph on population versus pollution concentration.
- Ground water pollution within a community tends to vary directly with population density.	- Same as above.
- Pollution, if left unchecked, may eventually directly effect man's health recreation and standard of living.	- List all lakes in N.Y. State presently considered unfit for swimming and fishing.

- That success in individual research is many times due to trial and error. When someone is doing original work there is no definite path to follow.	- Identify the problem he has selected to study. - Gather available information pertaining to the project he has selected. - Seek out and interview local authorities connected with the subject matter of the research project. - Perform experiments to prove hypothesis. - Keep accurate written records of data collected during experimentation. - Analyze failures to determine alternative methods of solving the problem. - Present oral reports to class to discuss progress. - Write a summary report as to conclusions arrived at through the completion of experimental project.
- that although cells are basically similar, they vary considerably in structure. Structure depends on the function they serve and the organisms in which they are found.	- identify the various cells found in a leaf of a given plant under the microscope. - identify the various cells found in the roots of the same plant. - identify the various cells found in the stem of the same plant. - list the cells which are similar and those which are different. - explain the differences in cells on the basis of their function.
- that germination of seeds require certain conditions. During this critical period of germination many plants are lost because they lack some or all of the conditions necessary.	- list the different conditions needed in the germination of a dicot and a monocot seed. - plant different species of the two basic type seed plant with various conditions

CONTINUED

needed for germination missing.
- determine which condition is the most critical condition necessary for germination of that species.
- determine the germination period for different plants under ideal conditions.
- determine the percentage of germination for seeds within the same plant family, under the same conditions.
- label a packet of seeds as to the best means of germination.

- all green plants make use of chlorophyll in the production of food. The role of chlorophyll is just as complex as its composition.

- draw diagrams of the structure of chlorophyll.
- identify chlorophyll within solutions.
- determine the wave lengths of light which are absorbed by chlorophyll in the production of food.
- identify the elements needed for the production of chlorophyll.
- identify the sites in plants where the production of chlorophyll takes place.
- determine the growth rate of a plant related to the amount of chlorophyll present.

Advance Biology — Grade 12

- that vitamin B_1 is a plant growth stimulator which is produced by young leaves of a plant and transported to the roots where it is used in plant growth.

- identify the structure of vitamin B_1 and classify it into a category of compounds.
- select plants appropriate for experiment during a short growth period.
- determine number of plants of each type needed for experimentation and control.
- keep accurate growth records of all parts of plants.
- determine the length of time required to

CONTINUED

	establish differential growth and end plant life. - determine whether roots of experimental plants are disproportionally larger than the rest of plant. - determine maximum amount of B_1 needed to stimulate plant growth.
- that factors which affect plant growth can cause involuntary movement of the plant toward the stimulating influence. These movements are called tropisms.	- list the different kinds of plant tropisms. - determine the affect each has on the growth pattern of a particular plant. - determine which tropism has the greatest affect in a short period of time. - determine which tropism has the greatest affect over a long period of time. - determine which plants of a given sample are more susceptible to a particular tropism.
- that the great diversity in algae forms and where they are found is related to the adaptability of life forms to their environment.	- collect samples of algae from as many different places as possible, keeping records of samples and location. - prepare slides of the various algae collected. - identify the number of different specimens collected. - list the differences found between the different forms of algae. - explain why the different forms of algae exist in different locations under different conditions on the basis of the individual differences found.
- that the general relationships in the study of genetics can be brought out by the study of generations of the fruit fly.	- write a paper on the physiology of the fruit fly. - identify male and female fruit flies. - identify the various stages in the development of a fruit fly.

CONTINUED

- determine the location of salivary glands of larva forms of fruit flies where chromosomes are located.
- etherize fruit flies in any stage of development.
- identify the stage of a sample fruit fly using the microscope.
- remove salivary gland and study chromosomes contained therein.
- identify the nucleus and draw diagrams of the chromosomes found in the respect fruit fly.
- list the different structures found in the chromosomes.
- predict the characteristics of the offsprings in a studied male and female fruit fly mated.

Advance Biology — Grade 12

- bone tissue is a complex composition of minerals which may vary within certain percentages. The study of bone composition can be done through ashing.

- identify various bone samples and locate the part of the body they are derived from.
- ash the bone samples.
- identify the minerals which compose the bone samples by the proper identification procedure.
- determine the percentage of each mineral present in the mix.
- determine if bones from different parts of a body have varying percentages of minerals.
- list the sources of food which will supply large amounts of minerals found in the bone samples.

- that simple marine life, such as Grantia, has the power to regenerate its own life form.

- list the grass structures that a sample of Grantia sponge has.
- compare the Grantia sponge with sponges of different species and list differences

CONTINUED

and similarities.
- draw diagrams of the observed specimen.
- facilitate the regeneration process by dividing the sample into fine pieces.
- observe the location sites of the regeneration process.
- explain the regeneration process as to taking place at new sites or old sites.